# Opportunities in Emerging Indian NewSpace

**“India: Opportunities in an Emerging Space Journey”**
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# Indian Space Program


**Feb. 16, 1962**

INCOSPAR formed by DAE

Establishing TERLS started

**Nov. 21, 1963**

First sounding rocket launched

**Jan. 01, 1967**

Satellite communication earth station setup at Ahmedabad

**Jan 1, 1972**

ISRO formed under DAE

**June 1, 1972**

Space Commission and Department of Space set up,

**ISRO brought under DOS**

**.....ISRO has come a long way to ….**

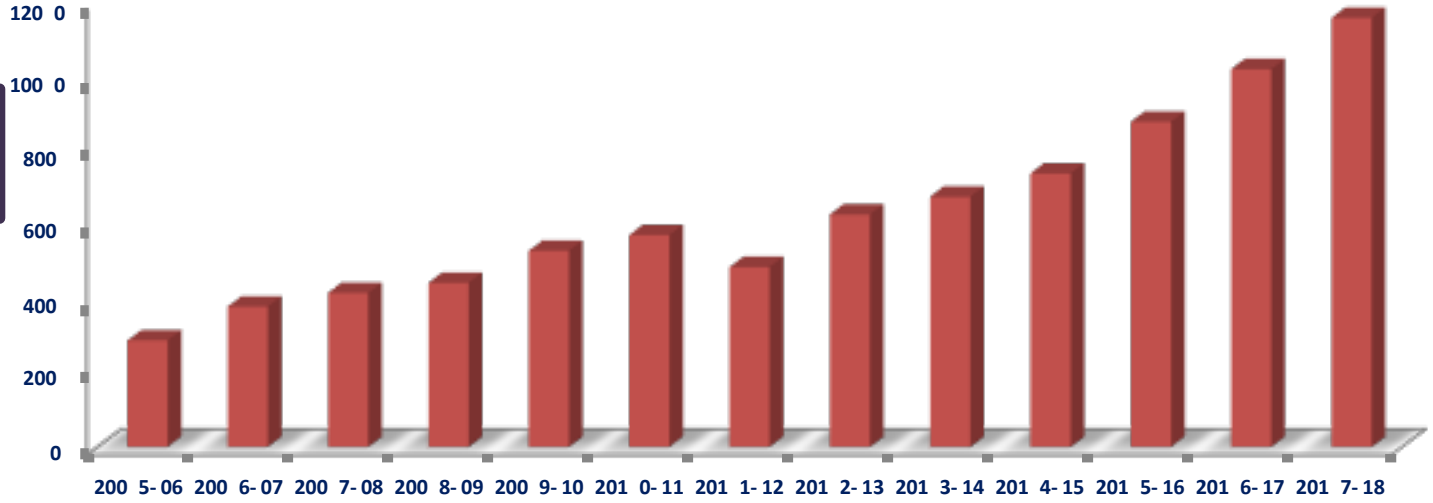
- 97 Spacecraft Missions
- 65 Launch Missions
- Launched 237 foreign satellites of 28 Countries
- 2 Re-entry Missions
- 9 Students Satellites
- 2 Experimental Missions : RLV-TD and Scramjet

**.....Firmed plan for future space technology**

# Industry Space Program : Growth over years

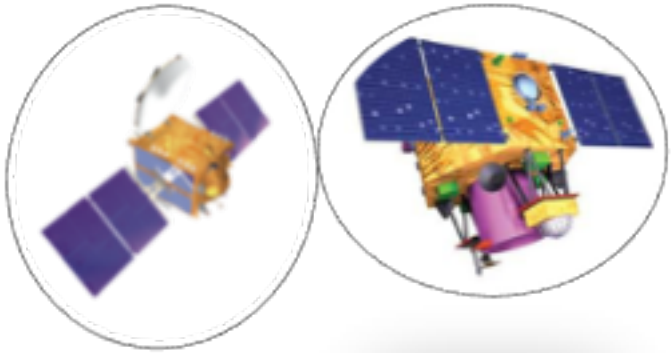
**DOS/ISRO Budget**
(In Million Euro)

***1 Euro= 79 INR***



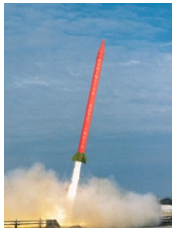

World class Launchers

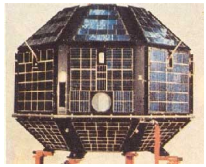
- **15 Communication satellites**
- 02 Meteorological satellite
- 08 Navigation satellite
- **17 EO satellites**



- SRE, RLV TD, Scramjet etc.
- Chandrayaan , Mangalyaan
- Many Developmental projects

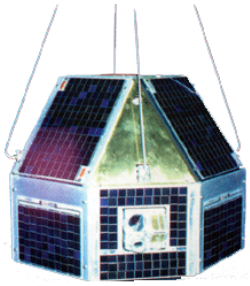
# Industry Participation - Evolution





**Experimental Phase**
**1960's & 1970's**

- ❖Industry Interface Initiation
- ❖Motor cases
- ❖Interstage structures
- ❖Ground systems

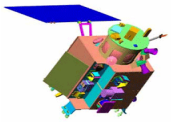


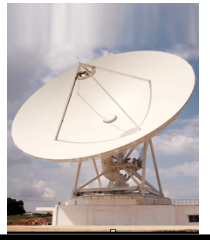
**Developmental Phase**
**1980's**

- ❖Enabling Industry for production
- ❖Infrastructure
- ❖Mobile Service Tower
- ❖Liquid engines
- ❖Propellants
- ❖Avionics systems
- ❖Metallic Materials

**Operational Phase**
**1990's**

- ❖Involvement of industry for development
- ❖Electrical harnessing
- ❖Avionic packages
- ❖Facility operation

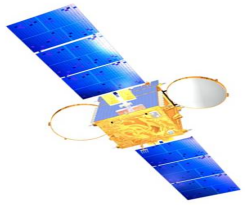




**Advanced Missions**
**2000's**

- ❖Larger Industry participation
- ❖Larger aggregates
- ❖Second launch pad turnkey contract
- ❖Deep space network
- ❖Indigenization
- ❖Expansion of AIT capacity

# Industry Participation : Current Scenario



- Structure
- Mechanisms Elements
  (Reflector Deployment, Solar Array Drive etc)
- Thermal Systems
  (Heat Pipes, OSR, Tapes etc)
- Solar Panels, Battery

- HMC fabrication & Screening
- Electronic Packages
- Sensor & Optics
- C/S Band TTC Transponder

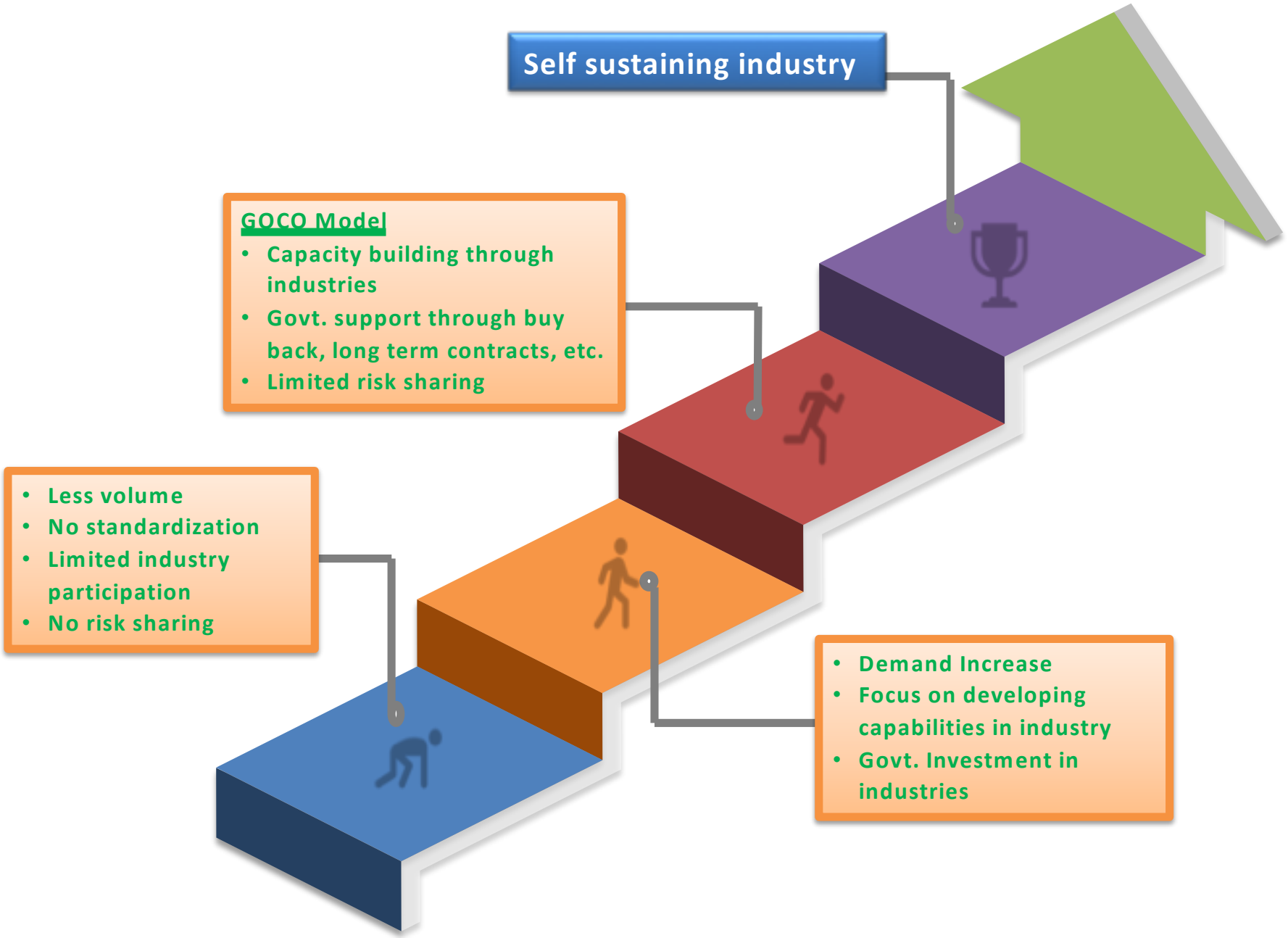
- Vikas Engine
- Composites
- Propellant production
- L 40 Stage Integration
- Components & Modules

- Specialty Metals/Alloys
- Propellant Tanks
- Mobile Launch Pedestal

- Weather Radar Systems
- Automatic Weather Stations
- Data Acquisition & Checkout Systems

- Satellite Earth Stations
- Value Added Products &Software Solutions

# Step by Step creation of Space Eco System



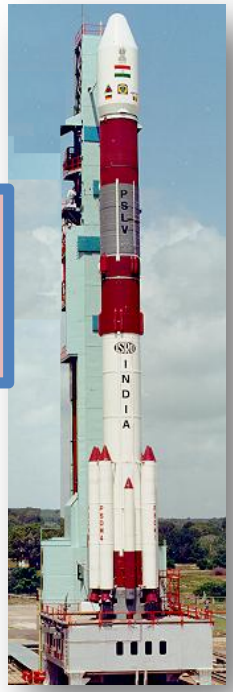
# India-Europe : Track record of Successful Partnership

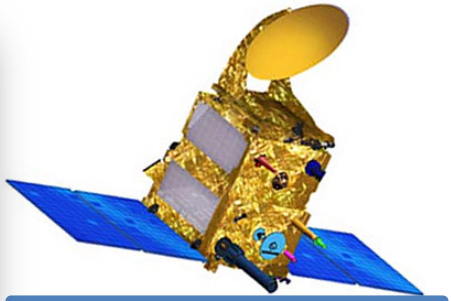
**W2M** and **HYLAS** Satellite, Platform and AIT by ANTRIX

**Megahtropiques:** Indo-French Joint Mission

TTC services provided to SES, CNES, KSAT, SSC, DLR etc

**43** Satellites for European customers



**SARAL:** Indo-French Joint Mission

**Dedicated missions**-DMC-3, Spot 6, Spot 7 and Agile

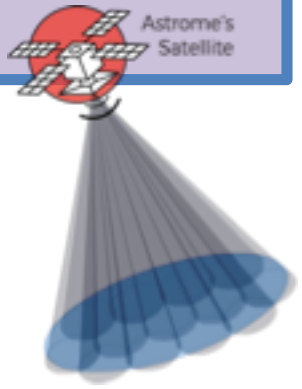
# Drivers of NewSpace in India

- ISRO and ANTRIX enabling private industry participation
- Surge in domestic as well as international demand
- Technological advancements
  - Maturity in space technology elements
  - Stabilized products
  - Clear visibility of long-term programmatic requirements
- Government Initiatives like Start-up-India, Digital India, Make in India
- FDI upto 100% in satellites-establishment and operation, subject to the sectoral guidelines of the Department of Space/ISRO, under the Government route

# NewSpace Players in India

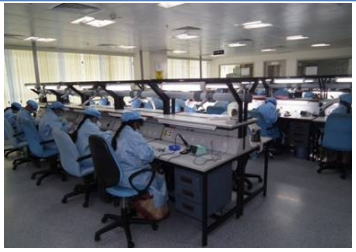
## Astrome Technologies

- Aim to provide high speed broadband internet from space
- 150 High Throughput Satellites in 1400 km LEO orbit, beaming 100 Gbps per satellite by 2020




## Ananth Technologies

- Experienced aerospace company with expertise in Avionics, Electronics and Power package production for satellite and launch vehicle
- Established facility for Nanosat and Microsat AIT
- Transforming from ISRO vendor to satellite manufacturer



## Bellatrix

Developing orbital launch vehicles and electric propulsion for satellites

## Team Indus

Founded in 2011, with an ambition to become the first private enterprise to undertake lunar mission

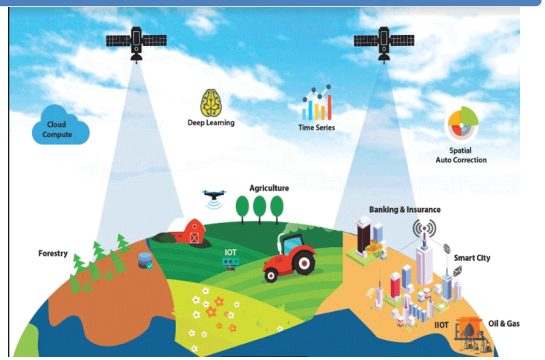
# NewSpace Players in India

## Manastu Aerospace

- Team Manastu, along with the Indian Institute of Technology, Bombay , has indigenously developed a green propulsion technology.

## Satsure Analytics

- Large area analytics company working towards improving financial inclusion of farmers by combining the power of satellite Remote Sensing, IOT, Machine Learning, Cloud computing, and Big Data Analytics.




## Agnikul Cosmos

- Developing launch vehicle “Agnibaan” capable of carrying 100 kg to LEO


## Exseed Aerospace

- Founded in 2017, focusing on small satellite platform development

# ANTRIX Role in Strengthening Industry Participation

Licensing / Licensed production

Access to state of the art infrastructure

Connect to partners /customers globally


Assistance in regulatory / Govt. procedures

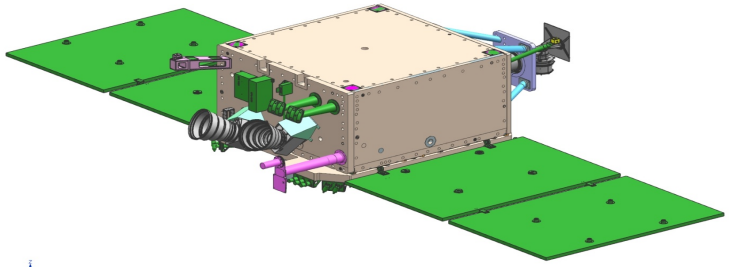

Brand association

Incubation assistance

Partnership for sustainable business model

# Looking forward

- Small Satellite Launch Vehicle (SSLV) by 2019-2020
- PSLV, SSLV and Smallsat production –greater role of Industry
- Indian Private Space Industry attaining higher level of functionality
- Sub-systems of commercial interest through TT, leading to sustainable partnership




# Summary

- Growing demand is driving space commerce
- Emergence of NewSpace in India is enabling the sourcing of systems not considered earlier
- The increased capabilities of Indian NewSpace will provide access to highly skilled manpower, and competitive cost to European Industry